

# EXHIBIT "A"

10/21/2015

The Benefits of Corrugated Stainless Steel Tubing (CSST) and CSST Installation & Safety Information

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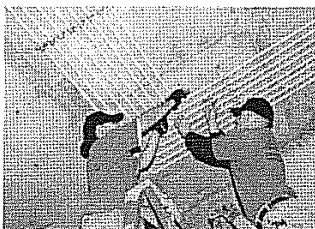
## WHAT IS CSST?

### Corrugated Stainless Steel Tubing (CSST)

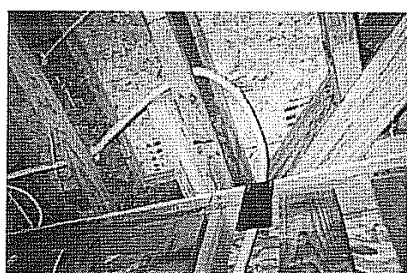
Corrugated Stainless Steel Tubing (CSST) is a flexible, stainless steel pipe used to supply natural gas and propane in residential, commercial and industrial structures. Coated with a yellow, or in some cases, a black exterior plastic coating, CSST is usually routed beneath, through and alongside floor joists in your basement, inside interior wall cavities and on top of ceiling joists in attic spaces.

### Benefits of CSST

CSST features many benefits over the traditional method in its durability and practicality. CSST has a proven resistance to leaks due to far fewer connections made during installation. When black iron pipe is installed, every time the pipe changes direction, a joint needs to be fitted and checked for leaks. CSST offers flexibility and is able to be snaked through walls and around obstacles with fittings placed only at the ends of the run.



Another benefit of this material is the amount of installation time it saves. By most estimates, CSST can be installed in a third of the time it takes to install black iron pipe. Even though CSST is more expensive than the traditional black iron pipe, its overall cost is less when factoring in labor and installation.



CSST should not be confused with natural gas appliance flexible connectors. Flexible connectors are used to attach moveable appliances to the gas piping system. CSST is typically routed beneath, through or alongside floor joists in the basement, inside interior wall cavities and on top of ceiling joists in attic spaces.

### Installation & Safety

Like all gas piping systems, CSST must be properly installed. CSST must be installed by a qualified professional and in accordance with the Manufacturer's Design and Installation (D&I) Guide, which now expressly includes bonding and grounding of the system. The D&I Guide specifically calls for the system to have a minimum 6-gauge bonding wire between the CSST and the building's grounding electrode in order to reduce the chances of a natural gas leak or fire from electrical/lightning energy. Some previously installed CSST systems may not have the proper bonding for optimal safety.

If after inspecting your home or business, you find CSST, it is strongly recommended that you determine if it is properly bonded. A bonding device should be installed on your natural gas system (per CSST Direct Bonding Tech Bulletin) in order to reduce the chances of a natural gas leak or fire.

Manufacturers of black jacketed CSST products which have been tested and listed to ICC-ES LC 1024, "CSST Utilizing Arc Resistant Protective Jackets", may not require or include in their instructions for the additional direct-bonding step that is required with standard yellow CSST products. However local codes are controlling and may differ from manufacturer's requirements. Local codes are governing and must be adhered to. ([back to top](#))

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### Direct Bonding of Standard (Yellow) CSST

Direct bonding is required for gas piping systems incorporating standard (yellow) or uncoated CSST whether or not the connected gas equipment is electrically powered. This requirement is provided as part of the manufacturer's instruction for single-family and multi-family buildings and required by the 2009 and later editions of the National Fuel Gas Code, the International Fuel Gas Code and the Uniform Plumbing Code. A person knowledgeable in electrical system design, the local electrical code and these requirements should specify the bonding for commercial applications.

Standard CSST installed inside or attached to a building or structure shall be electrically continuous and direct-bonded to the electrical ground system of the premises in which it is installed. The gas piping system shall be considered to be direct-bonded when installed in accordance with the following:

The bonding conductor is permanently and directly connected to the electrical service equipment enclosure, the grounded conductor at the electrical service, the grounding electrode conductor, or to one or more of the grounding electrodes used. When an additional grounding electrode(s) is used for the gas service, it shall be bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding system. For single and multi-family structures a single bond connection shall be made on an accessible rigid piping component or CSST fitting located downstream of the utility gas meter or second-stage LP regulator. The bonding clamp attachment point may be at any location within the gas piping system. However, the shortest practical bonding wire length will improve the effectiveness of the direct-bond. The corrugated stainless steel tubing portion of the gas piping system shall not be used as the point of attachment of the bonding clamp under any circumstances. (Fig. 1, 2)

The bonding conductor shall be no smaller than a 6 AWG copper wire or equivalent. The bonding conductor shall be installed and protected in accordance with the *National Electrical Code, NFPA 70, (NEC)* and *Canadian Electrical Code CSA-C22.1 (CEC)*. Bonding/grounding clamps shall be installed in accordance with its listing per UL 467 and shall make metal-to-metal contact with a rigid pipe component or CSST fitting. This direct-bond is in addition to any other bonding requirements as specified by local codes for ground fault protection.

The 2015 edition of the National Fuel Gas Code, International Fuel Gas Code, and Uniform Plumbing Code limits the length of the bonding conductor to 75-ft. When there are no local code requirements for the length of this conductor refer to the manufacturer's instructions or the NEC / CEC for guidance regarding the permissible length of the bonding conductor.

Figure 1: Bonding Clamp Attachment to Pipe

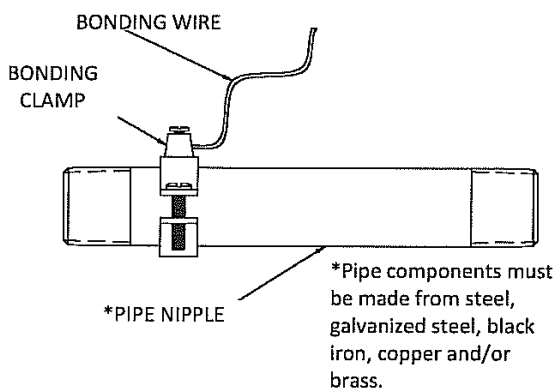
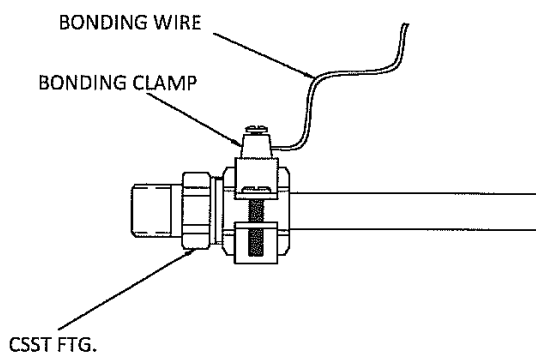


Figure 2: Bonding Clamp on CSST Fitting



*Manufacturers of black jacketed CSST products which have been tested and listed to ICC-ES LC 1024, "CSST Utilizing a Protective Jacket", may not require or include in their instructions the additional direct-bonding step that is required with standard (yellow) CSST products. However local codes may be more restrictive and may differ from manufacturer's requirements. Local codes take precedence and must be adhered to.*

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CSST Safety Solution

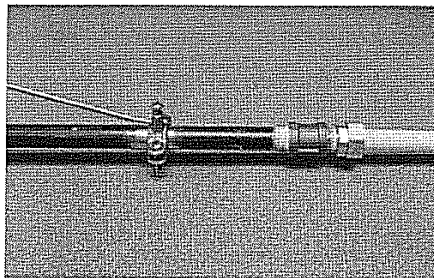
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### CSST SAFETY SOLUTION Bonding and Grounding

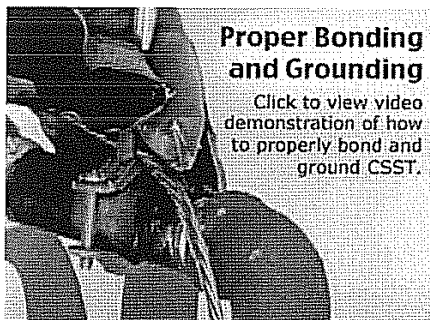


If you find CSST after inspecting your home or business, it is strongly recommended that you determine if the CSST system is properly bonded and grounded. A bonding device should be installed on your natural gas system in order to reduce the chances of a natural gas leak or fire. Bonding is provided primarily to prevent a possible electric shock to people who come in contact with the gas piping and other metal objects connected to the grounding system. Nearby lightning strikes can also result in an electrical surge and can potentially puncture a hole in the CSST. Proper bonding and grounding ([click here for tech bulletin](#)) will reduce the risk of damage and fire from a lightning strike.



*Bond clamp and 6-gauge bond wire attachment*

If you are unsure as to whether your home has CSST or whether it has been properly bonded and grounded, contact a licensed electrician to arrange for a professional inspection.



#### Proper Bonding and Grounding

Click to view video demonstration of how to properly bond and ground CSST.

[Download CSST Direct Bonding Tech Bulletin](#)

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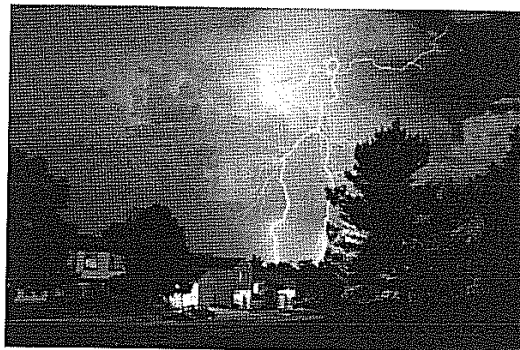
Lightning and CSST



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### CSST AND LIGHTNING

Lightning is a highly destructive force. Even a nearby lightning strike that does not strike a structure directly can cause all electrically conductive systems in the structure to become energized. Nearby lightning strikes can result in a power surge that can damage certain gas tubing systems and ultimately cause a fire. Properly bonding and grounding the Corrugated Stainless Steel Tubing (CSST) significantly reduces the risk of damage and fire from a lightning strike.



Care should be taken when installing CSST to maintain as much separation as reasonably possible from other electrically conductive systems in the home.

Electricians and other trained professionals should consult local building codes as to required separations for CSST from conductive systems including metallic chimney liners, metallic appliance vents, metallic ducting and piping, and electrical cables.

Areas with high lightning risk include but are not limited to: Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Michigan, Mississippi, Missouri, New Mexico, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia and West Virginia.



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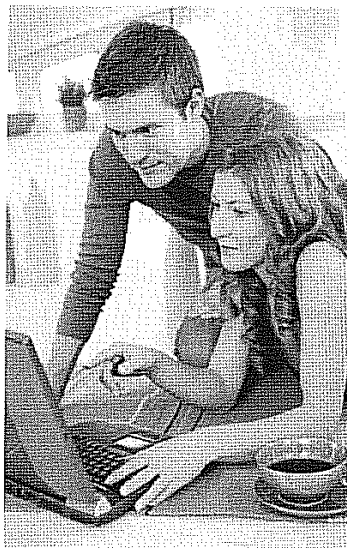
CSST Safety - Frequently Asked Questions

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### FREQUENTLY ASKED QUESTIONS

- What is CSST?
- What does CSST look like?
- What are the benefits of flexible gas piping?
- When was CSST first introduced into homes?
- How many homes have CSST?
- Where is CSST located in my home?
- Is CSST safe to use in my home?
- What are the effects of lightning on CSST?
- How many homes are struck by lightning every year?
- Which states have a high lightning risk?
- If I have CSST in my home, what do I do and who do I call?
- What is bonding and grounding?
- Why is it important to bond and ground my CSST?
- Who is recommended to perform this work?
- What information do I need to provide my electrician?
- What is the difference between CSST and flexible gas appliance connectors?
- What do I need to know about current building codes?
- What is the current fuel gas code?
- If I would like to contact the manufacturer regarding questions or concerns, how do I determine which manufacturer/product was used?



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#### QUESTION: What is CSST?

**ANSWER:** Corrugated Stainless Steel Tubing (CSST) is a flexible, stainless steel pipe used to supply natural gas and propane in residential, commercial and industrial structures. ([back to top](#))

#### QUESTION: What does CSST look like?

**ANSWER:** CSST is often coated with a yellow, or in some cases, a black exterior plastic coating. CSST should NOT be confused with flexible gas appliance connectors - the product that joins a moveable appliance to your home or building's gas supply line. ([back to top](#))

#### QUESTION: What are the benefits of flexible gas piping?

**ANSWER:** Besides providing greater durability, CSST is flexible, allowing it to be snaked around walls and through obstacles with fittings needed only at the ends of each run. Reducing the number of fittings is beneficial as each additional joint needs to be fitted and checked for leaks. A CSST gas piping system has less joints, and therefore less potential leak paths. ([back to top](#))

#### QUESTION: When was CSST first introduced into homes?

**ANSWER:** CSST was first introduced in Japan in the 1980s. It was introduced in the U.S. in 1990. ([back to top](#))

#### QUESTION: How many homes have CSST?

<http://www.csstsafety.com/CSST-FAQs.html>

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### CSST Safety - Frequently Asked Questions

**ANSWER:** In the U.S., about 500,000 new homes per year have CSST installed; that number is about half of the number of new homes built each year that use gas for heating and cooking. As of 2012, about seven million homes in the U.S. had CSST installed. Since 1989, approximately one billion feet has been installed in residential, commercial, and industrial structures. ([back to top](#))

#### **QUESTION: Where is CSST located in my home?**

**ANSWER:** CSST is usually routed beneath, through and alongside floor joists in your basement, inside interior wall cavities and on top of ceiling joists in attic spaces or connected to fixed appliances such as water heaters. ([back to top](#))

#### **QUESTION: Is CSST safe to use in my home?**

**ANSWER:** Like all approved gas piping systems, CSST is safe when properly installed. CSST must be installed by a qualified professional and in accordance with the Manufacturer's Design and Installation (D&I) Guide, including [bonding and grounding](#) of the system. ([back to top](#))

#### **QUESTION: What are the effects of lightning on CSST?**

**ANSWER:** Lightning is a highly destructive force. Even a nearby lightning strike that does not strike a structure directly can cause systems in the structure to become electrically energized. This power surge can potentially puncture a hole in CSST and cause a fire. ([back to top](#))

#### **QUESTION: How many homes are struck by lightning every year?**

**ANSWER:** Lightning causes 7,216 house fires every year, according to the U.S. Fire Administration.

##### **Additional information:**

U.S. house fires per year	253,500	NFPA Oct 2009
Housing units in the U.S.	129,925,421	U.S. Census Aug 2010
Lightning strikes per year	22,000,000	NOAA Aug 2010
Lightning related insurance claims in 2009	185,789	III June 2010

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#### **QUESTION: Which states have a high lightning risk?**

**ANSWER:** All states have lightning activity and associated risks. [Click here](#) to view a map illustrating the areas where lightning strikes occur most frequently. ([back to top](#))

#### **QUESTION: If I have CSST in my home, what do I do and who do I call?**

**ANSWER:** If you have CSST in your home or business you should determine if the fuel gas piping system is [bonded and grounded](#). This requirement will include the attachment of a listed [bonding clamp \(click for picture\)](#) and bonding wire to the gas piping system. For assistance with this, please consult with a licensed electrician who can perform the inspection and upgrade per the [CSST Direct Bonding Tech Bulletin](#). ([back to top](#))

#### **QUESTION: What is bonding and grounding?**

**ANSWER: Bonding:** Connecting metallic systems to establish electrical continuity and conductivity.

**Grounding:** Connecting to the ground or to a conductive body that extends to ground connection.

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#### **QUESTION: Why is it important to bond and ground my CSST?**

**ANSWER:** Bonding is provided primarily to prevent a possible electric shock to people who come in contact with the gas piping and other metal objects connected to the grounding system. Nearby lightning strikes can result in an electrical surge that can potentially puncture a hole in CSST and cause a fire. Proper [bonding and grounding](#) will reduce the risk of damage and fire from a lightning strike. ([back to top](#))

#### **QUESTION: Who is recommended to perform this work?**

**ANSWER:** Bonding is considered electrical work so it is recommended that a licensed electrician is contacted to inspect or perform any electrical bonding work. ([back to top](#))

#### **QUESTION: What information do I need to provide to my electrician?**

**ANSWER:** Information to provide an electrician can be found in the [CSST Direct Bonding Tech Bulletin \(click to view](#)

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CSST Safety - Frequently Asked Questions

*and print PDF).* ([back to top](#))

**QUESTION: What is the difference between CSST and flexible gas appliance connectors?**

**ANSWER:** CSST should NOT be confused with flexible gas appliance connectors – the product that joins a moveable appliance to your home or building's gas supply line. The difference is flexible connectors attach directly to the moveable appliance from the wall or floor. CSST is usually routed beneath, through and alongside floor joists in your basement, inside interior wall cavities and on top of ceiling joists in attic spaces. ([back to top](#))

**QUESTION: What do I need to know about current building codes?**

**ANSWER:** U.S. model building codes currently require direct bonding of CSST. They did not require this prior to 2009, and that is why there are many homes in the U.S. where CSST is not installed to current model code requirements, that can benefit from the [bonding and grounding](#) upgrade.

*Reference 2009 NFPA 54 National Fuel Gas Code, sec. 7.13.2, and 2011 NFPA 70 National Electric Code, sec. 250.104 Informational Notes No. 2.* ([back to top](#))

**QUESTION: What is the current fuel gas code?**

**ANSWER:** NFPA 54 National Fuel Gas Code. Sec 7.13.2 specifies the CSST bonding requirement. ([back to top](#))

**QUESTION: If I would like to contact the manufacturer regarding questions or concerns, how do I determine which manufacturer/product was used?**

**ANSWER:** The name of the manufacturer/product is listed on the tubing every three feet. ([back to top](#))



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### CONTACT US

For questions or more information on the NASFM Yellow CSST Safety Campaign please contact:



**National Association of State Fire Marshals**

Jim Narva, Executive Director

[jnarva@narvaassociates.com](mailto:jnarva@narvaassociates.com)

For technical question regarding a particular manufacturer, please reference the list below:

Most requirements for CSST systems are similar across the individual manufacturers that offer a CSST product. However, there are instances where technical instructions offered by one manufacturer may vary from instructions offered by another manufacturer.



**Omega Flex Inc.**

Product: Tracpipe CSST

<http://www.tracpipe.com/>

800.355.1039



**Titeflex Corp.**

Product: Gastite CSST

[www.gastite.com](http://www.gastite.com)

800.662.0208



**Pro-Flex, LLC**

Product: Proflex CSST

[www.proflexcsst.com](http://www.proflexcsst.com)

877.798.6291



**Ward Manufacturing, LLC**

Product: WARDFLEX CSST

[www.wardmfg.com](http://www.wardmfg.com)

800-248-1027



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